

Algebraic Expressions:

1) Additive Identity

$$2) -1(2) - 12 + 8$$

$$-18 + 12 + 8 = -22$$

$$3) \sum \left\{ \sqrt{9}, \frac{12}{2} \right\}$$

$$4) 20 - x^2$$

Polynomials

$$1) 8a^3 + 9a^2 + 5p + -4a^3 + 12a^2 + -9$$

$$4a^3 + 21a^2 + 5p + -9$$

$$2) 4x^2 + -14x^2 = -10x^2$$

$$3) (5x^2 + 1)^2 = 25x^4 + 10x^2 + 1$$

$$4) \frac{10x^3y^3 - 25x^3y^2}{2y + 5 \sqrt{20x^2y^4 + 0x^2y^3 + 3x^2y^2 - xy^2 - 14y + 12} + 20x^2y^4 + 50x^2y^3}$$

$$\frac{-50x^3y^3 + 3x^3y^2 + 50x^2y^3 + 125x^2y^2}{128x^2y^2}$$

$$5) \frac{35}{35} \left(\frac{2ax}{y} \right) + \left(\frac{5}{35} \right) \cdot \frac{y}{y}$$

$$\frac{645x}{35y} + \frac{ry}{35y} = \frac{645x + ry}{35y}$$

$$6) \frac{a+b}{2a(a-b)} \cdot \frac{2(2a-b)(a-b)}{(a+b)(a+b)} = \frac{(2a-b)}{a(a-b)}$$

$$7) \frac{x+1}{x^2-x-6} \cdot \left(\frac{x+1}{(x-3)(x+2)} \right) \cdot \frac{(x-3)(x+2)}{(x-3)(x+2)} = \frac{x+1}{3(x+2)}$$

$$LCD: (x-3)(x+2)$$

$$8) (x^2 - y^2) + (x^2 - 2xy + y^2)$$

$$(x+y)(x-y) + (x-y)(x-y)$$

$$(x-y)(x+y+x-y)$$

$$(x-y) \cdot 2x$$

$$9) 64a^3 + 27b^6$$

$$(4a + 3b^2)(16a^2 - 12ab^2 + 9b^4)$$

$$10) (x - 3y - z)^2$$

$$(x - 3y - z)(x - 3y - z)$$

$$x^2 - 3xy - xz - 3xy + 9y^2 + 3yz + -xz + 3yz + z^2$$

$$x^2 + 9y^2 + z^2 - 6xy + -2xz + 6yz$$

Exponents and Radicals

$$1) \frac{8a^{-1/5} b^{3/4} c^{-4}}{2b^{1/5} c^{-2}} = \frac{4b^{5/4}}{a^{1/5} c^4}$$

$$2) \left(\frac{16}{81} \right)^{2/3} \left(\sqrt[4]{\frac{16}{81}} \right)^{1/2} = \left(\frac{2}{3} \right)^3 = \frac{8}{27}$$

$$3) \sqrt[4]{27} = \sqrt[4]{3^3} = 3^{3/4} = 3^{1/2} = \sqrt{3}$$

$$4) 5\sqrt{27} - 2\sqrt{12}$$

$$15\sqrt{3} - 4\sqrt{3} = 11\sqrt{3}$$

$$5) (5 + 3\sqrt{3})(7 - 3\sqrt{3})$$

$$35 - 5 \cdot 3\sqrt{3} + 7 \cdot 3\sqrt{3} - 3\sqrt{9}$$

$$35 + 2 \cdot 3\sqrt{3} - 3\sqrt{9}$$

$$6) \frac{5}{(\sqrt{2}-\sqrt{7})(\sqrt{2}+\sqrt{7})} = \frac{5\sqrt{2}+5\sqrt{7}}{2-7}$$

$$7) 4\sqrt{\frac{2}{27}} = \frac{4\sqrt{2}}{\sqrt{27}} = \frac{4\sqrt{2}}{\sqrt{3^3}} = \frac{4\sqrt{2}}{3\sqrt{3}} = \frac{4\sqrt{6}}{9}$$

Complex Numbers

$$1) 7 - 8i + -1 + 13i$$

$$6 + 5i$$

$$2) 5\sqrt{5} \cdot \sqrt{12}$$

$$i\sqrt{5} \cdot 2i\sqrt{3} = 2i^2\sqrt{15} = -2\sqrt{15}$$

$$3) (3+2i)(3-7i)$$

$$9 - 21i + 6i - 14i^2$$

$$23 - 15i$$

$$4) 5 + i$$

$$5) i^{351} = -i$$

$$351 \div 4 = 87 R3$$

Binomial Theorem/Counting Theory

$$1) 3^{rd} \text{ term}$$

$$2) 1 \quad 5 \quad 10 \quad 10 \quad 5 \quad 1$$

$$3) \frac{10!}{5!} = 10 \cdot 9 \cdot 8 \cdot 7 \cdot 6 = 30240$$

$$4) \binom{13}{4} = \frac{13!}{4!(13-4)!} = \frac{13!}{4!9!} = \frac{13 \cdot 12 \cdot 11 \cdot 10}{4 \cdot 3 \cdot 2 \cdot 1} = 715 \text{ ways}$$

Solving Equations

$$1) 3(1-2z) - 3 = -9(1+2z) + 3z$$

$$3 - 6z - 3 = -9 - 18z + 3z$$

$$-6z = -9 - 15z$$

$$9z = -9$$

$$z = -1$$

$$2) \left(\frac{5}{x+3} - \frac{1}{x-2} = \frac{-4}{x+3} \right) (x+3)(x-2)$$

$$5(x-2) - 1(x+3) = -4(x-2)$$

$$5x - 10 - x - 3 = -4x + 8$$

$$4x - 13 = -4x + 12$$

$$10x = 25$$

$$x = 2.5$$

$$3) a = \frac{3a}{1-r} - 5$$

$$(a+5) = \frac{3a}{1-r}$$

$$(1-r)(a+5) = 3a$$

$$a + 5 - ar - 5r = 3a$$

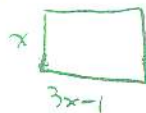
$$-ar - 5r = 3a - a - 5$$

$$r(-a-5) = 2a-5$$

$$r = \frac{2a-5}{-a-5}$$

$$af 5$$

4) Let



$$P = 2L + 2W$$

$$38 = 2(3x-1) + 2x$$

$$38 = 6x - 2 + 2x$$

$$38 = 8x - 2$$

$$40 = 8x$$

$x = 5$ The width is 5 m

5)

$$R \cdot T = D$$

Train 1	x	5	5x
Train 2	x+5	5	5(x+5)

$$5x + 5(x+5) = 375$$

$$5x + 5x + 25 = 375$$

$$10x + 25 = 375$$

$$10x = 350$$

$$x = 35$$

40 mph rate of faster train

6) Skip

$$7) 2x(x-5) = 2x-9$$

$$2x^2 - 10x = 2x - 9$$

$$2x^2 - 12x + 9 = 0$$

$$a=2 \quad b=-12 \quad c=9$$

$$x = \frac{12 \pm \sqrt{(12)^2 - 4(2)(9)}}{2(2)}$$

$$x = \frac{12 \pm \sqrt{144 - 72}}{4}$$

$$x = \frac{12 \pm \sqrt{72}}{4} = \frac{12 \pm 6\sqrt{2}}{4}$$

$$x = \left\{ \frac{6 \pm 3\sqrt{2}}{2} \right\}$$

$$8) (4x-2)^2 = 9$$

$$16x^2 - 16x + 4 = 9$$

$$16x^2 - 16x - 5 = 0$$

$$(-16)^2 - 4(16)(-5) =$$

$$256 + 320 = 576$$

2 real, rational solutions

$$9) 2x^2 + 5x = -4$$

$$2x^2 + 5x + 4 = 0$$

$$5^2 - 4(2)(4)$$

$$25 - 32 = -7$$

$$10) (\sqrt{2x-1})^2 = (\sqrt{2x-7})^2$$

$$2x - 2\sqrt{2x} + 1 = 2x - 7$$

$$-2\sqrt{2x} + 1 = -7$$

$$-2\sqrt{2x} = -8$$

$$(\sqrt{2x})^2 = (4)^2$$

$$2x = 16$$

$$x = 8$$

$$11) \frac{3x^2 + 12x = 9}{3}$$

$$x^2 + 4x = 3$$

$$x^2 + 4x + 4 = 3 + 4$$

$$(\sqrt{x+2})^2 = \sqrt{7}$$

$$x+2 = \pm\sqrt{7}$$

$$x = -2 \pm \sqrt{7}$$

$$12) (x^2 + 3x + 4)(x-12) = 0$$

$$x^2(x+3) + 4(x+3) = 0$$

$$(x^2-4)(x+3) = 0$$

$$(x+2)(x-2)(x+3) = 0$$

$$x+2=0 \quad x-2=0 \quad x+3=0$$

$$x=-2 \quad x=2 \quad x=-3$$

$$x = \{-2, 2, -3\}$$

$$13) \sqrt[3]{11x+4} = (-5)^3$$

$$11x+4 = -125$$

$$11x = -129$$

$$x = \frac{-129}{11}$$

14)

	R	T	Amount completed
Jan	$\frac{1}{3}$	x	$\frac{x}{3}$
Josh	$\frac{1}{5}$	x	$\frac{x}{5}$

$$x = 3\frac{3}{4} \text{ hr}$$

$$30\left(\frac{x}{3} + \frac{x}{5}\right) = 2$$

$$10x + 6x = 60$$

$$16x = 60$$